

What Is Claimed Is:

1. A device for anisotropic etching of a substrate, in particular a silicon body, comprising a plasma source for generating a high-frequency electromagnetic alternating field, a chamber (53) and a reaction region (20) for generating a plasma having reactive species, within the chamber (53), by the action of the alternating field on an etching gas which can be introduced into the reaction region (20) and a passivation gas which can be introduced into the reaction region (20),

wherein means (5, 62, 63) are provided, which permit at least one first zone (23, 33, 43) acted upon predominantly or at least almost exclusively by the etching gas to be defined in the reaction region (20) and permit at least one second zone (22, 32, 42) acted upon predominantly or at least almost exclusively by the passivation gas to be defined in the reaction region (20), and, downstream from the reaction region (20), a mixing region (21) is provided with the aid of which reactive species generated in the first zone (23, 33, 43) from the etching gas and reactive species generated in the second zone (22, 32, 42) from the passivation gas can be blended with one another before they act on the substrate (59).

2. The device as recited in Claim 1, wherein the means (5, 62, 63) are formed in such a way that the gas supplied to the first zone (23, 33, 43) and the gas supplied to the second zone (22, 32, 42) are spatially separated from one another before reaching the mixing region (21), and during which the blending of both gases is at least largely prevented.

3. The device as recited in Claim 1 or Claim 2, wherein the plasma source is an inductively coupled plasma source having a coil (10), which can be used to generate a

plasma in the reaction region (20), in the first zone (23, 33, 43) and the second zone (22, 32, 42).

4. The device as recited in one of the preceding claims, wherein the means (5, 62, 63) are an insert body (5) which is made of, in particular, glass or ceramic and delimits at least one, in particular a plurality of passivation gas zones (22, 32, 42) spatially separated from each other and at least one, in particular a plurality of etching gas zones (23, 33, 43) spatially separated from each other, it being possible to supply the etching gas to the etching gas zones (23, 33, 43) via an assigned gas inlet, and to supply the passivation gas to the passivation gas zones (22) via an assigned gas inlet (13, 15).

5. The device as recited in one of the preceding claims, wherein the means (5, 62, 63) are an insert body (5), whose plan view is star-shaped, and which is, in particular, cylindrically symmetrical, is integrated into the chamber (53) or placed on it, and has partition walls (34) which separate the at least one etching gas zone (22) and the at least one passivation gas zone (23) from each other, and the insert body (5) being at least largely sealed by a plate (14) having gas entry openings (12, 13), on its side facing away from the substrate (59), and being open on its side facing the substrate (59).

6. The device as recited in one of the preceding claims, wherein the means (5, 62, 63) are an insert body (5), which is, in particular, integrated into the chamber (53) or placed on it, and whose plan view is, in particular, cylindrically symmetrical, and which has at least two guide tubes (32, 33), it being possible to supply the etching gas to a first part of the guide tubes (33) defining etching gas zones (23), and to supply the passivation gas to a second part of the guide tubes

(32) defining passivation gas zones (22), and the guide tubes (32, 33) having gas entry openings (12, 13) defined, in particular, by a cover plate (14), on their side facing away from the substrate (59), and the guide tubes (32, 33) being open on their side facing the substrate (59) and opening into the mixing region (21).

7. The device as recited in one of the preceding claims, wherein the means (5, 62, 63) are an insert body (5) which is, in particular, integrated in the chamber (53) or placed on it, and whose plan view is, in particular, cylindrically symmetrical, and which has an exterior wall (44) and a cover plate (14) through which at least one guide tube (32, 33) defining, in particular, a passivation zone (22) passes, the cover plate (14) having a gas entry opening (12, 13) assigned to the guide tube (32, 33), and the cover plate (14) having at least one further gas entry opening (12, 13), which leads into the interior of the insert body (5) or is connected to at least one additional guide tube (32, 33) defining, in particular, an etching gas zone (23).

8. The device as recited in Claim 7, wherein the guide tube(s) (32, 33) and/or the insert body (5) is open on its side facing the substrate (59) and opens into the mixing region (21), or the insert body (5) has, on its side facing the substrate (59), a base plate (11) having at least one gas exit opening (25).

9. The device as recited in one of the preceding claims, wherein the guide tubes (32, 33) are positioned, in particular, concentrically around an axis of symmetry of the chamber (53) and run parallel to one another, and/or a central guide tube (34) is provided, around which the additional guide tubes (32, 34) are, concentrically situated, in particular.

10. The device as recited in one of the preceding claims, wherein the etching gas zones (23, 33) and the passivation gas zones (22, 32) are situated in such a way that, in the mixing region (21), the reactive etching gas species produced from the etching gas and the reactive passivation gas species produced from the passivation gas are mixed as thoroughly as possible.

11. The device as recited in one of the preceding claims, wherein the means (5) is designed in such a way that it has an upper zone (42) with respect to the location of the substrate (59) and a lower zone (43) with respect to the location of the substrate (59), it being possible to supply the etching gas to one of the zones (43) via gas guides (15, 16), and to supply the passivation gas to the other of the zones (42), so that thorough mixing of both gases or of reactive gas species generated from them by the action of plasma first occurs at least substantially in the mixing region (21).

12. The device as recited in Claim 1 or Claim 2, wherein the plasma source is a microwave source, by which a plasma can be generated in the reaction region (20), in the first zone (23, 33, 43) and in the second zone (22, 32, 42), the microwave source having a waveguide assigned to each of the zones (22, 23, 32, 33, 42, 43) for injecting microwave radiation into the zones.

13. The device as recited in one of the preceding claims, wherein the means (5, 62, 63) have at least one etching gas lance (63) which can be used during operation to induce a directed gas flow of the etching gas, and/or at least one passivation gas lance (62), which can be used during operation to induce a directed gas flow of the passivation gas, or the means (5, 62, 63) have a showerhead having at least one opening for the etching gas and at least one opening for the passivation gas.

14. A method for anisotropic etching of a substrate, a silicon body in particular, a plasma source being used to generate a high-frequency electromagnetic alternating field, which generates a plasma having reactive species, within a chamber (53), in a reaction region (20), by the action of the alternating field on an etching gas introduced into the reaction region (20) and a passivation gas introduced into the reaction region (20), wherein in the reaction region (20), the etching gas is introduced predominantly or at least almost exclusively into at least one first zone (23, 33, 43) and the passivation gas is introduced predominantly or at least almost exclusively into at least one second zone (22, 32, 42), reactive etching gas species being generated in the first zone (23, 33, 43) by a plasma generated there, and reactive passivation gas species being generated in the second zone (22, 32, 42) by a plasma generated there, and the etching gas species and the passivation gas species being blended with one another in a mixing region (21) downstream of the reaction region (20), before they act on the substrate.

15. The method as recited in Claim 14, wherein the etching gas and the passivation gas at the same time and/or a minimized quantity of passivation gas is used compared to the quantity of etching gas.

16. The method as recited in Claim 14 or 15, wherein an etching gas donating fluorine radicals when acted on by plasma is used as an etching gas, and/or a passivation gas donating teflon-forming monomers when acted on by plasma is used as a passivation gas.

17. The method as recited in one of Claims 14 through 16, wherein an at least approximately constant proportion of the energy introduced into the plasma by the plasma source is input

into the passivation gas at least approximately independently of the passivation gas flow in the reaction region (20).